

Progress Report: Frontal Dynamics and Lateral Mixing at the Equator with Application to
the EPIC/IOP (NA06OAR4310058)

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Figures:

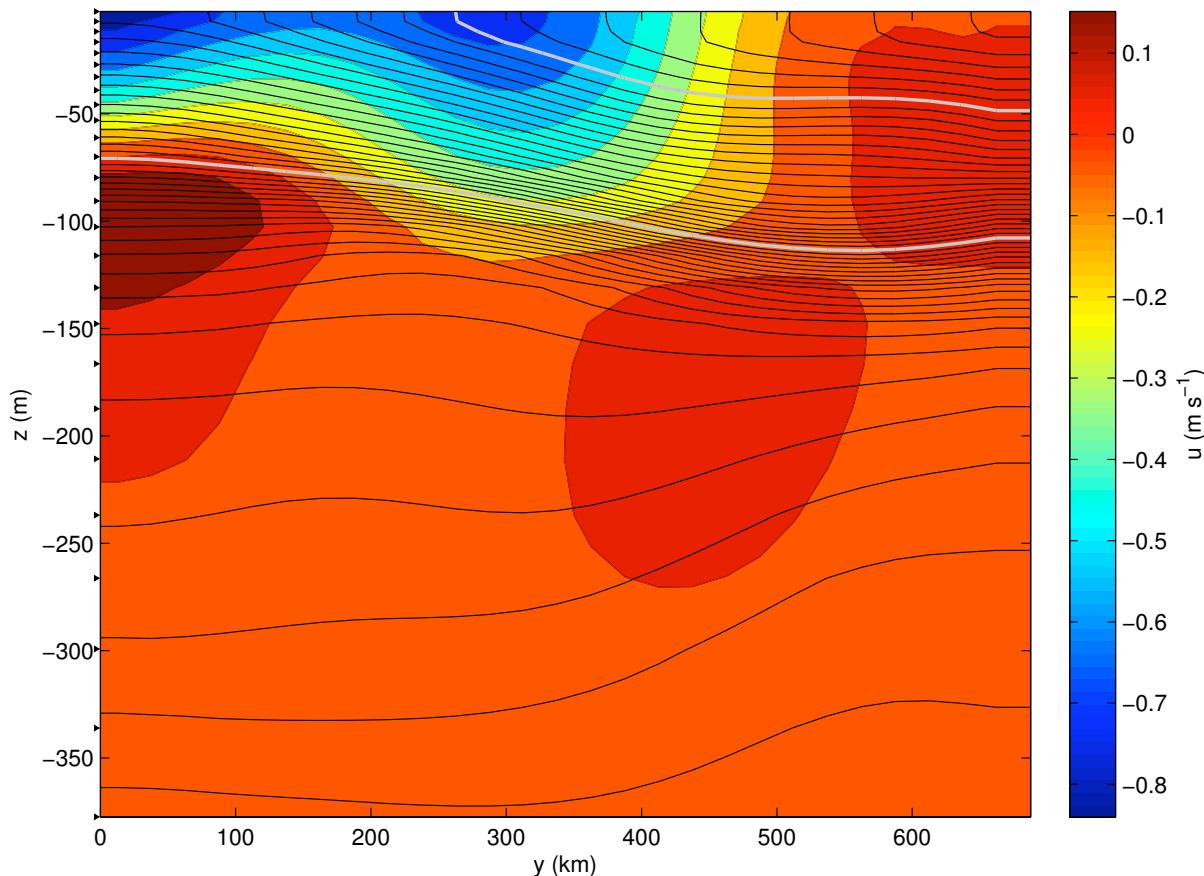


Figure 1: The initial conditions for the zonal velocity (shades) and density (contours) for the three dimensional numerical simulations. The contour interval for the density is 0.1 kg m^{-3} . The vertical grid spacing is indicated on the left axis. The equator is at $y = 0$.

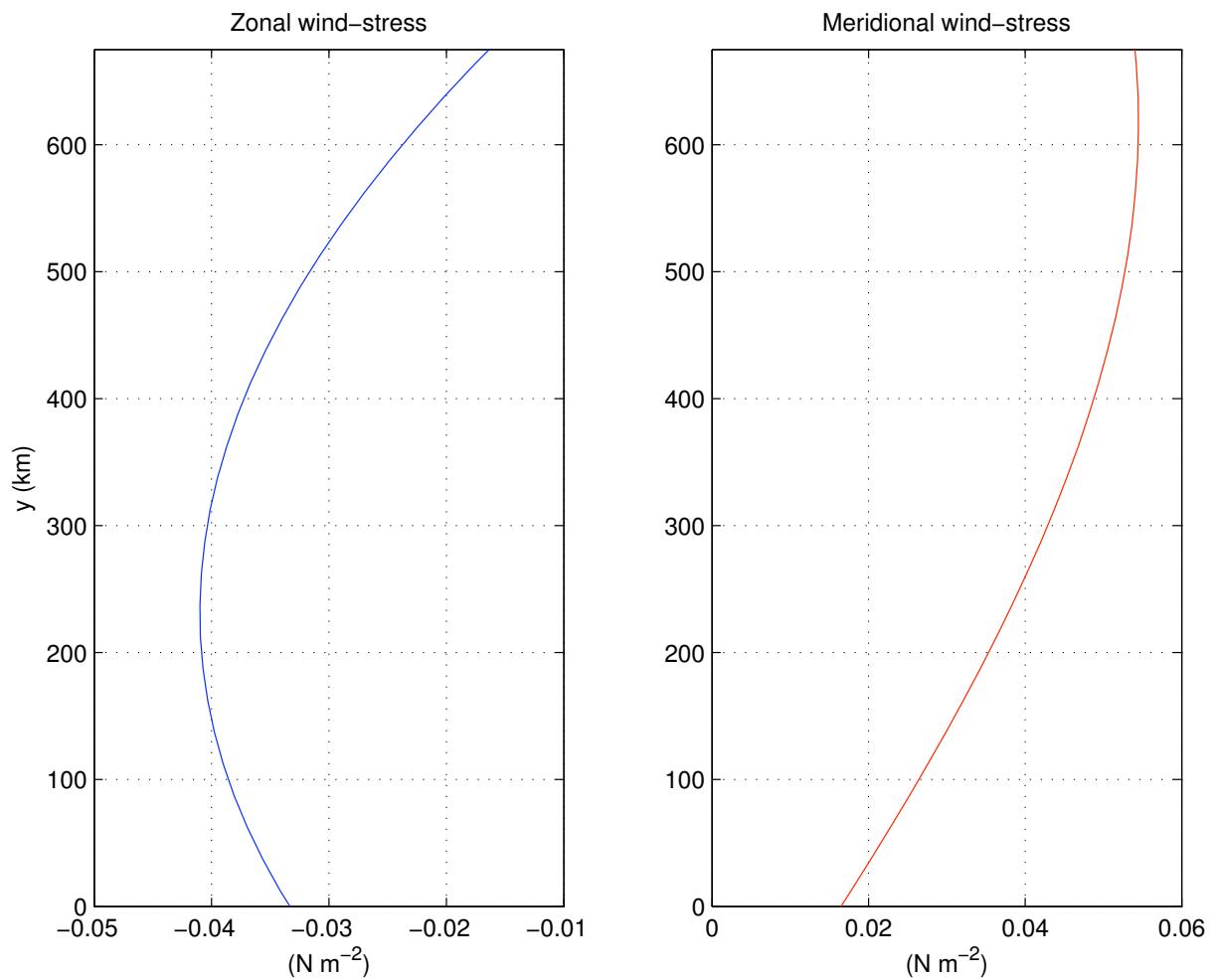


Figure 2: The meridional structure of the zonal and meridional wind-stress used in the wind-forced simulation.

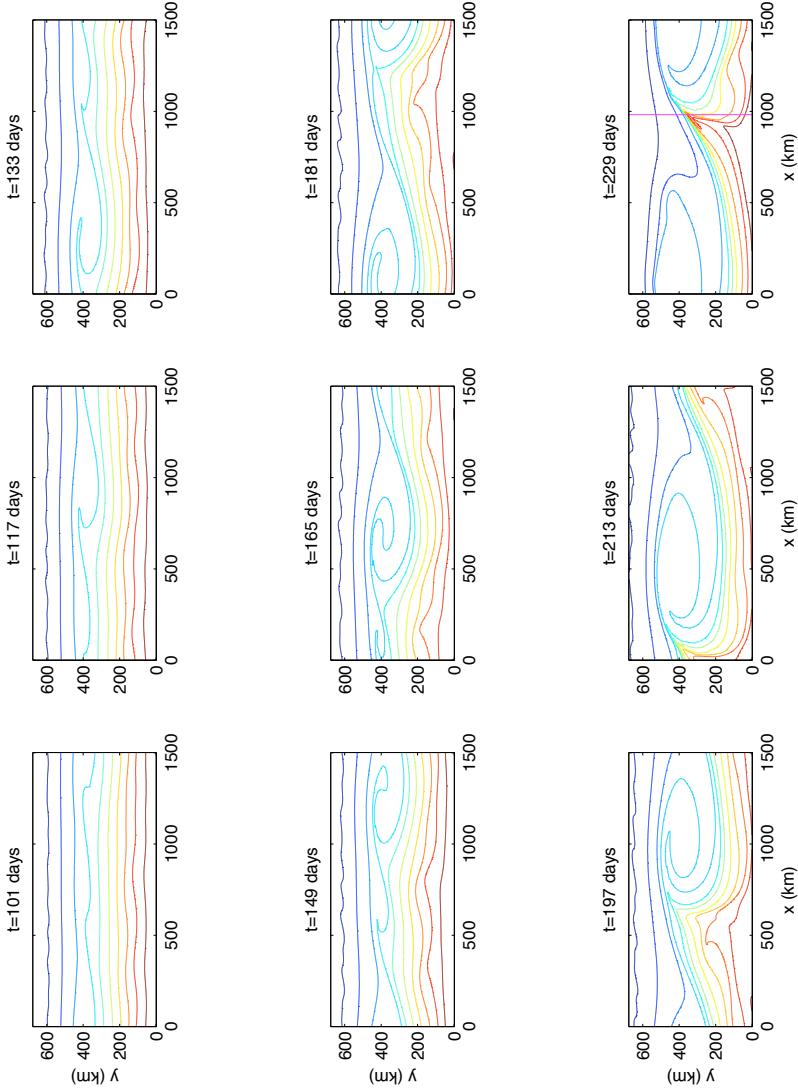


Figure 3: The temporal evolution of the surface density in the unforced run. The time is indicated on the top of each panel and the contour interval is 0.1 kg m^{-3} . The magenta line in the last panel denotes the location of the meridional section shown in Figure 4.

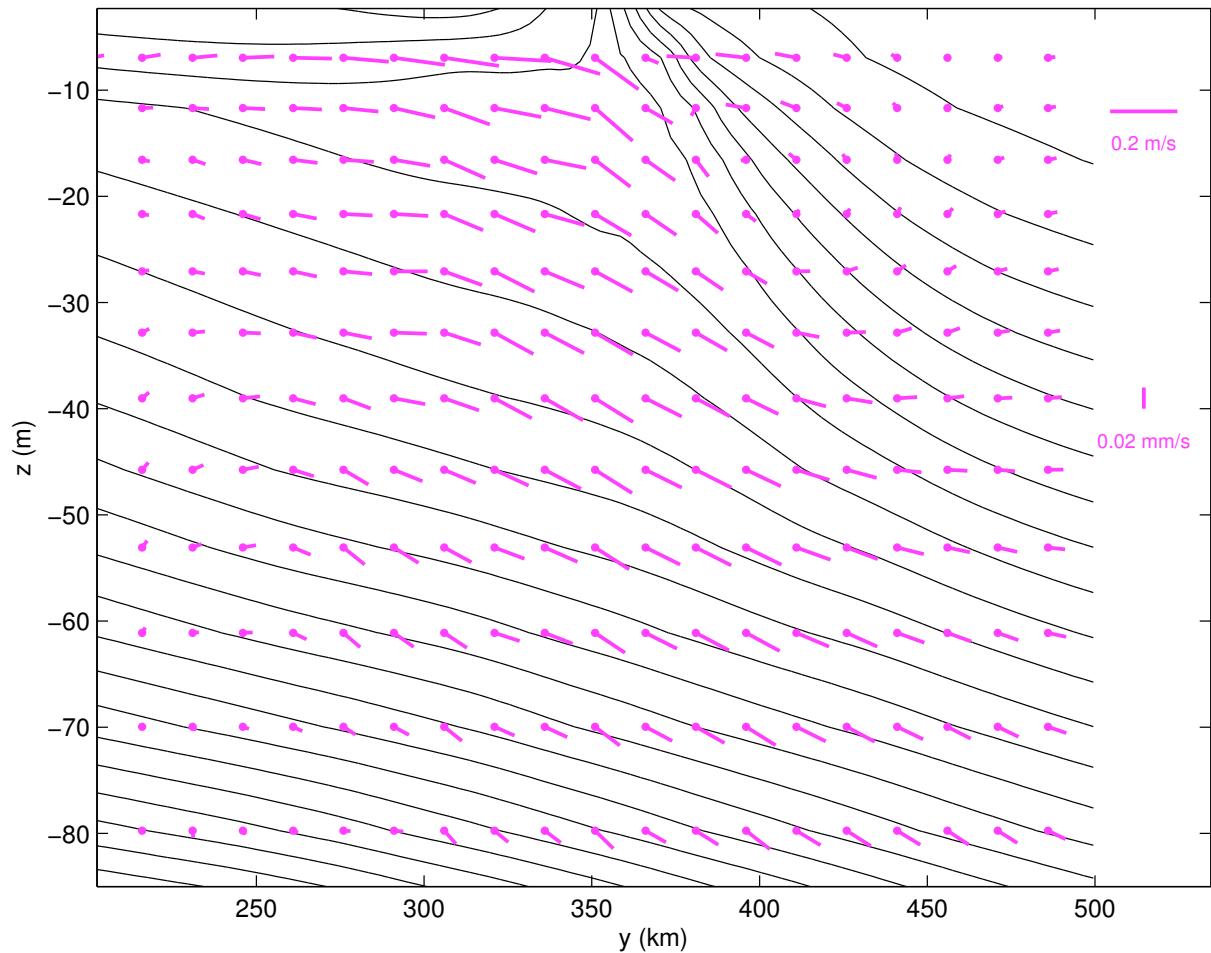


Figure 4: Meridional section of density and vectors of the meridional and vertical velocity at a front near the crest of a tropical instability wave at $t = 229$ days into the unforced simulation. Dots indicate the tail of the velocity vector and isopycnals are contoured in intervals of 0.1 kg m^{-3} . The zonal location of the section is shown in Figure 3.

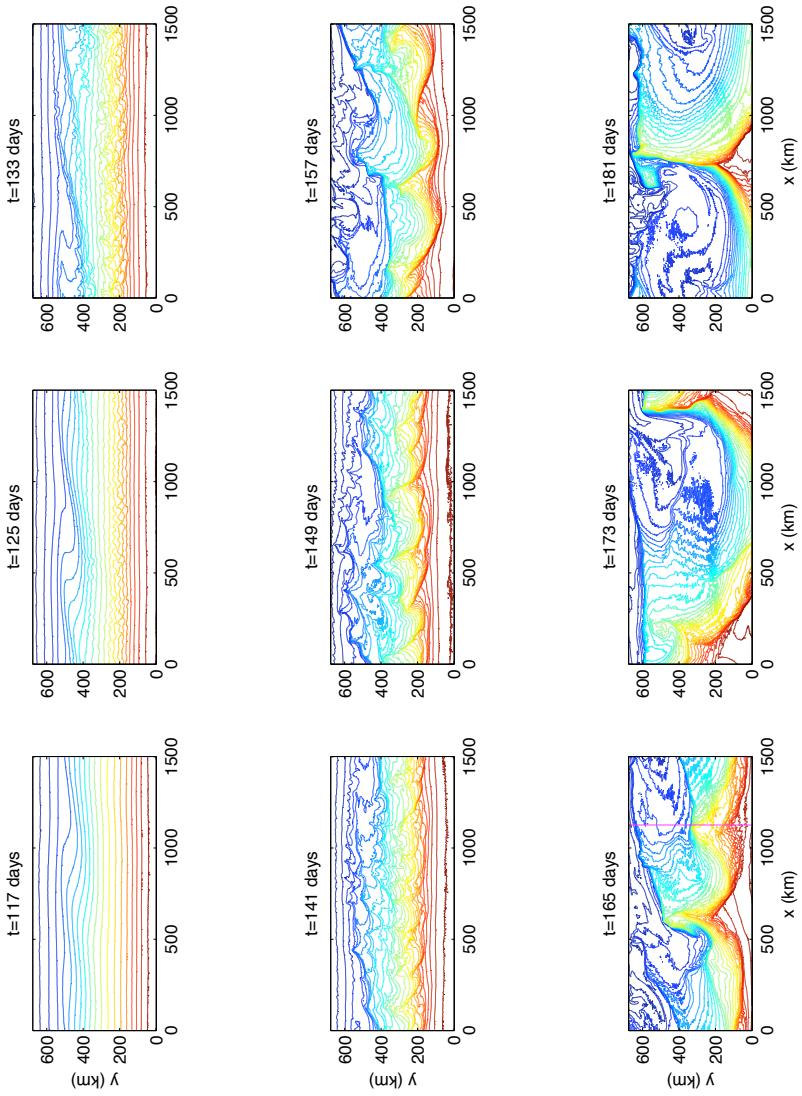


Figure 5: The temporal evolution of the surface density in the wind-forced run. The time is indicated on the top of each panel and the contour interval is 0.1 kg m^{-3} . The magenta line in the panel for day 165 denotes the location of the meridional section shown in Figure 7.

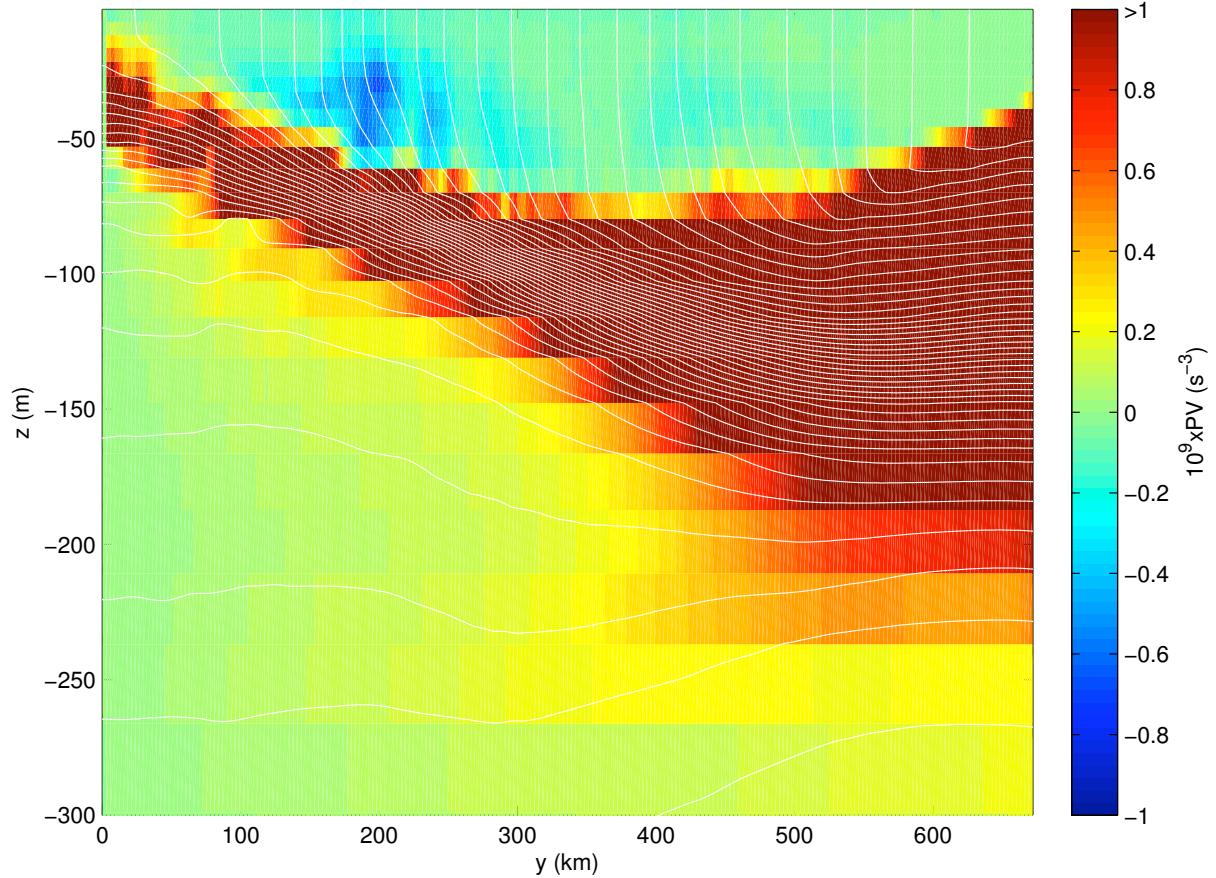


Figure 6: Meridional section of the zonally averaged density (contours) and potential vorticity day 133 of the wind-forced simulation. Isopycnals are contoured in intervals of 0.1 kg m^{-3} .

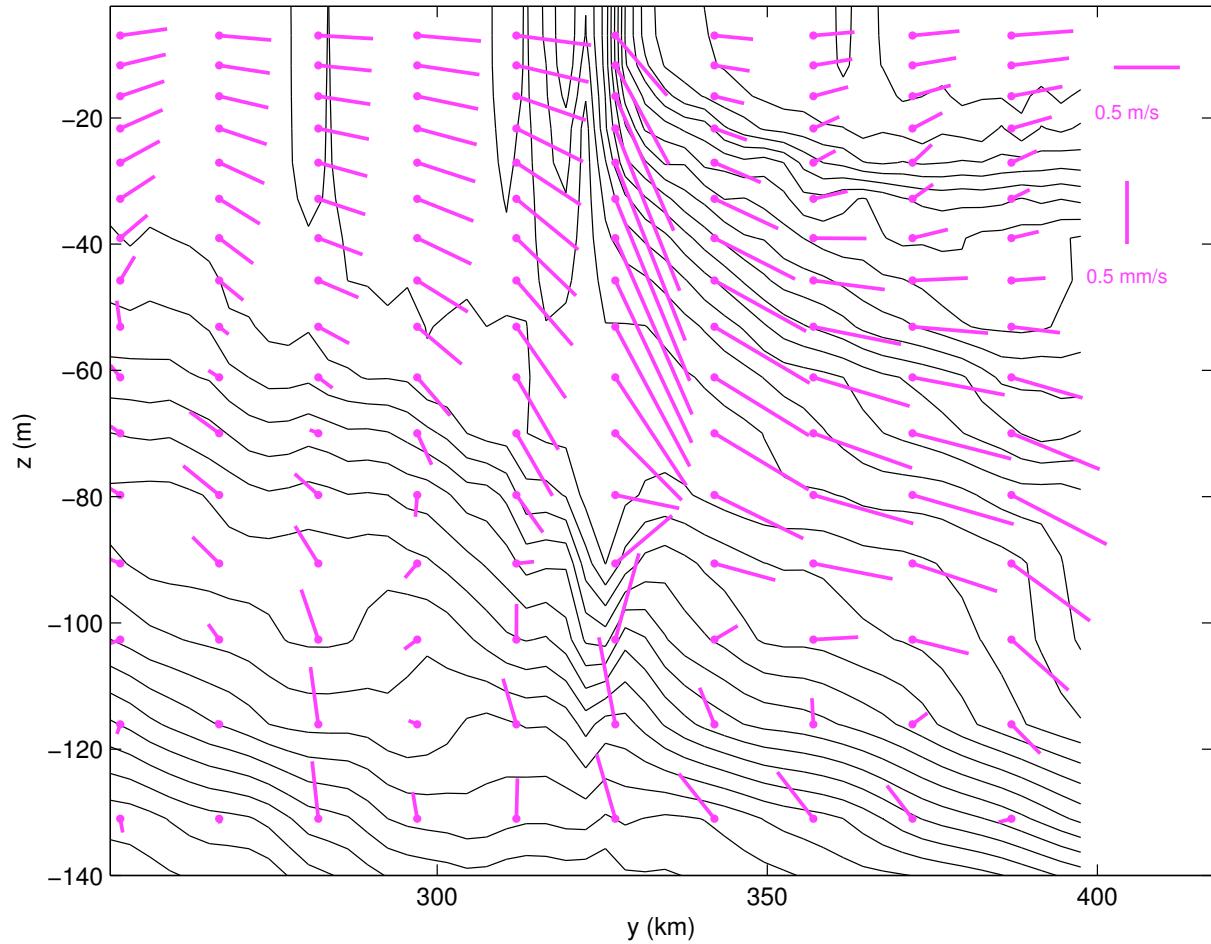


Figure 7: Meridional section of density and vectors of the meridional and vertical velocity at a strong at $t = 165$ days into the wind-forced simulation. Dots indicate the tail of the velocity vector and isopycnals are contoured in intervals of 0.1 kg m^{-3} . The zonal location of the section is shown in Figure 5.

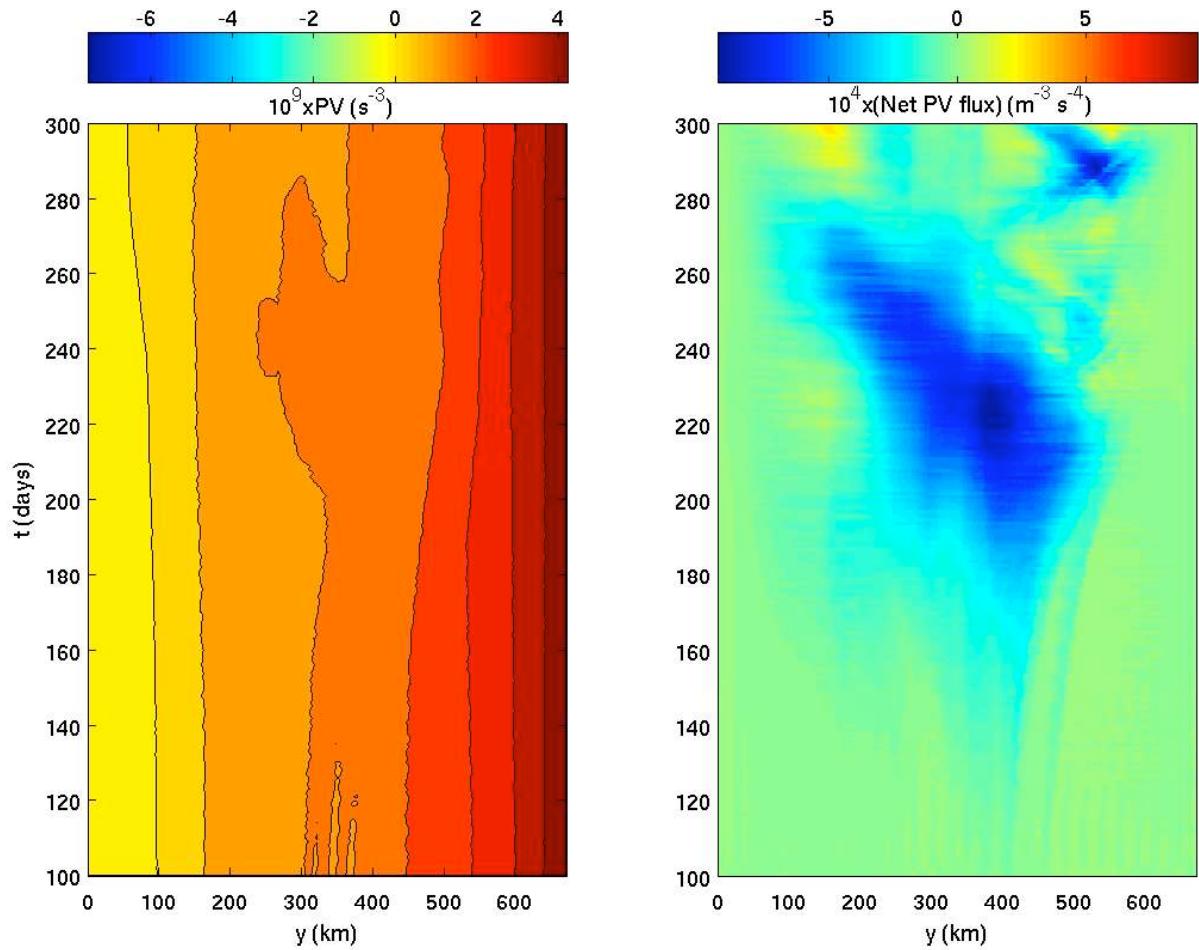


Figure 8: Temporal and latitudinal variability on the isopycnal layer highlighted with thick gray contours in figure 1 of the zonal averaged potential vorticity \hat{q} (left) and the net advective PV flux (right) for the unforced simulation. The net advective PV flux is calculated as $\iint qvdzdx$, where v is the meridional velocity, the vertical limits of integration correspond to the locations of the upper and lower density surfaces bounding the isopycnal layer, and the zonal integral runs over the full zonal extent of the domain.

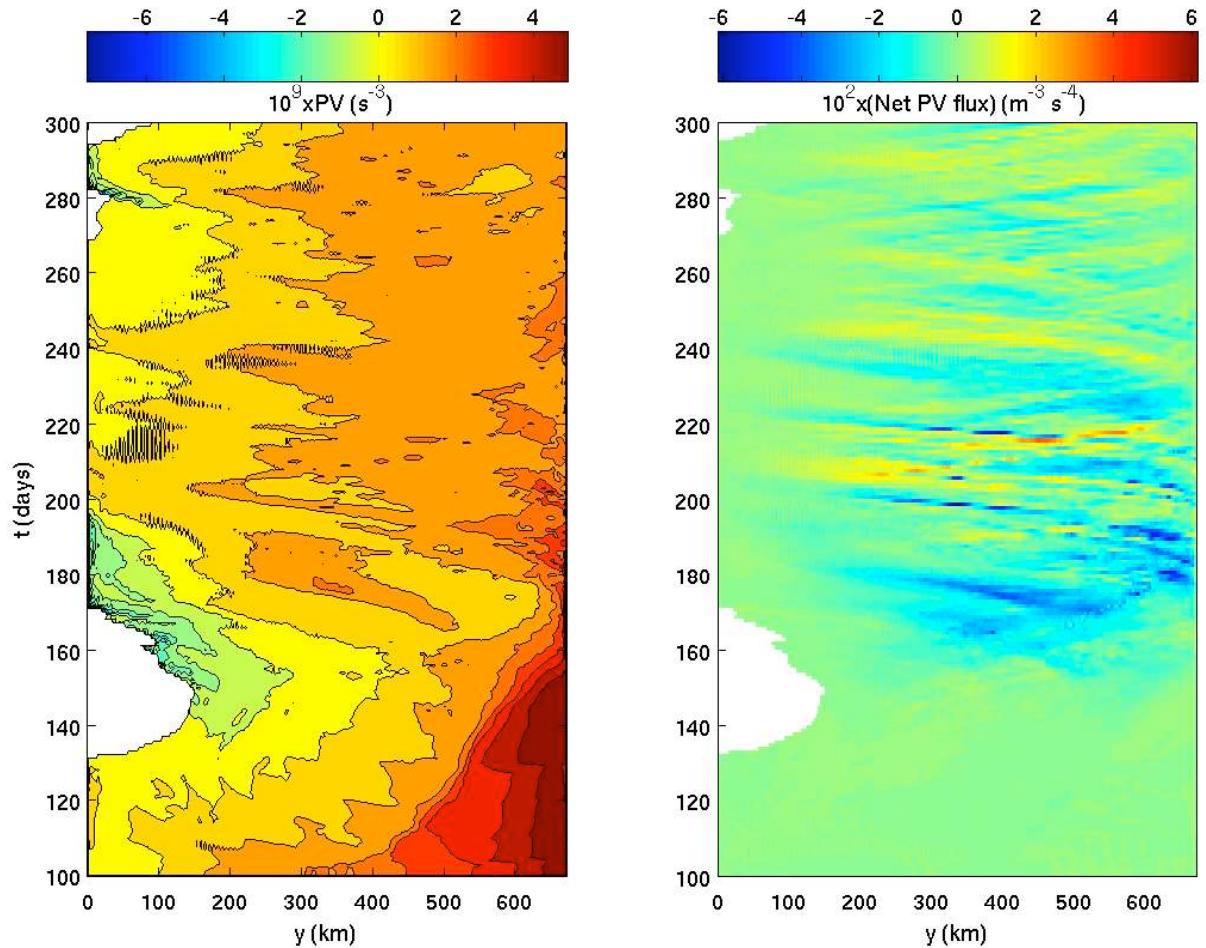


Figure 9: Temporal and latitudinal variability on the isopycnal layer highlighted with thick gray contours in figure 1 of the zonal averaged potential vorticity \hat{q} (left) and the net advective PV flux (right) for the wind-forced simulation. Note the different scale for the net advective PV flux in the forced and unforced simulations.

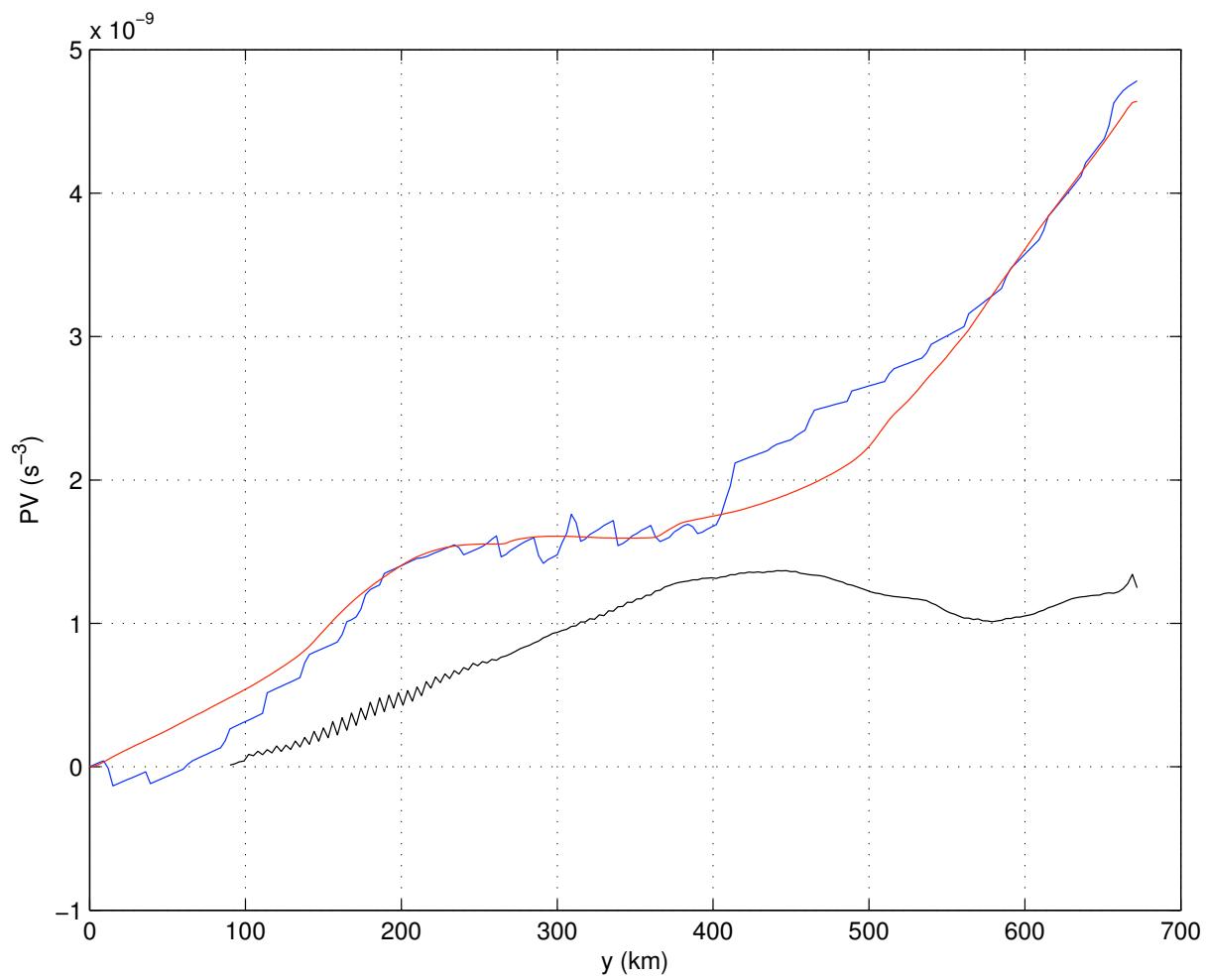


Figure 10: The zonal averaged potential vorticity \hat{q} on the isopycnal layer highlighted with thick gray contours in figure 1 at $t = 100$ days (blue) and averaged between day 170 and 200 for the unforced run (red) and the wind-forced run (black).